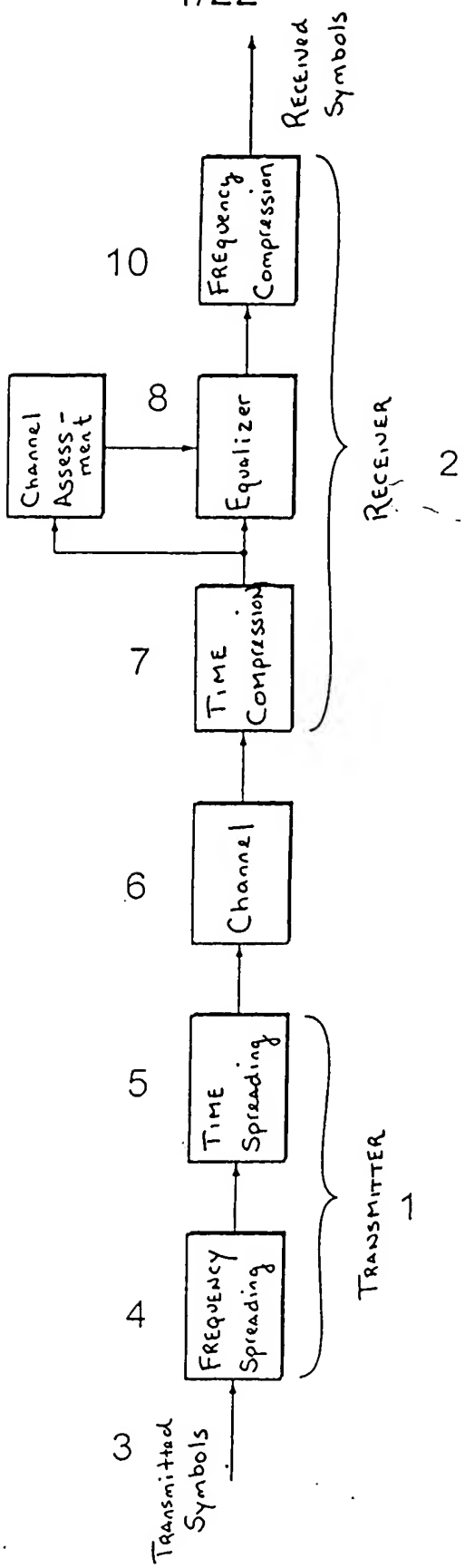

Transmitted Symbols
3
Frequency Spreading
4
Time Spreading
5
Channel
6
Time Compression
7
Channel Assess-ment
8
9
Equalizer
10
Frequency Compression
Received Symbols
Transmitter
1
Receiver
2

Fig. 1

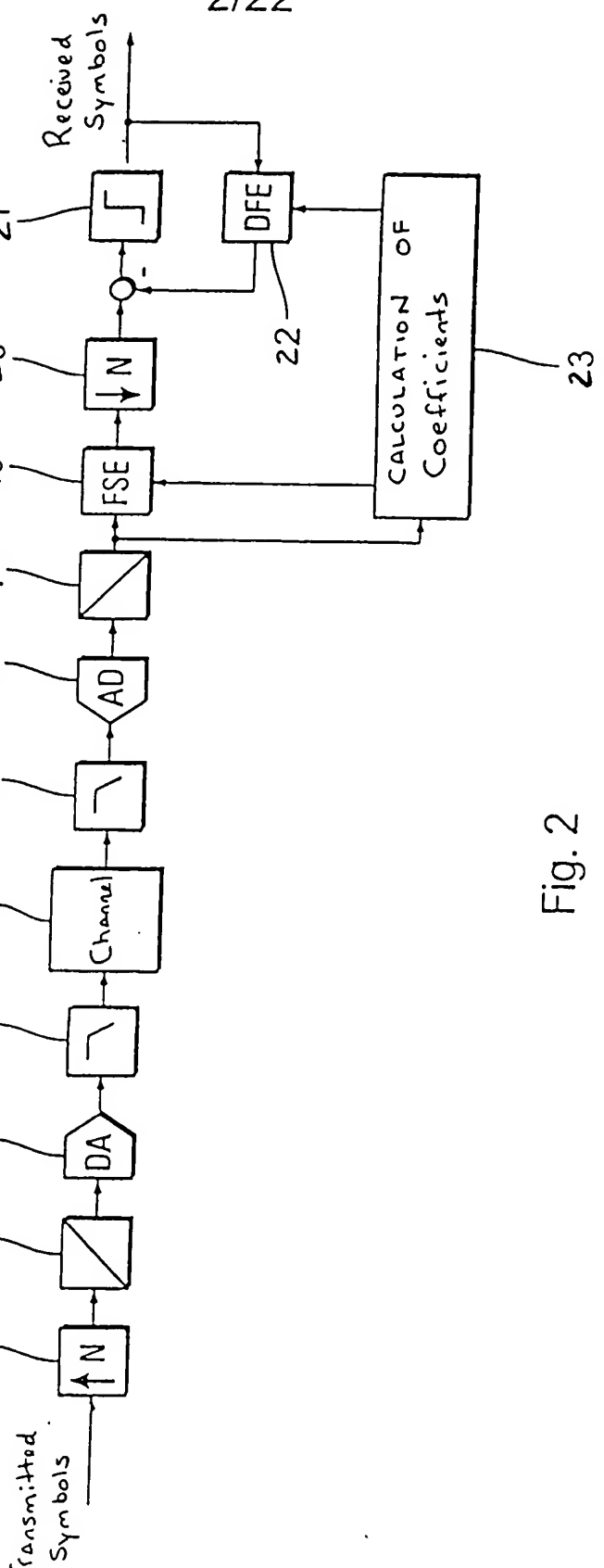

Transmitted Symbols
11
N
12
13
DA
14
15
Channel
16
17
AD
18
19
FSE
20
N
21
Received Symbols
DFE
22
CALCULATION OF Coefficients
23

Fig. 2

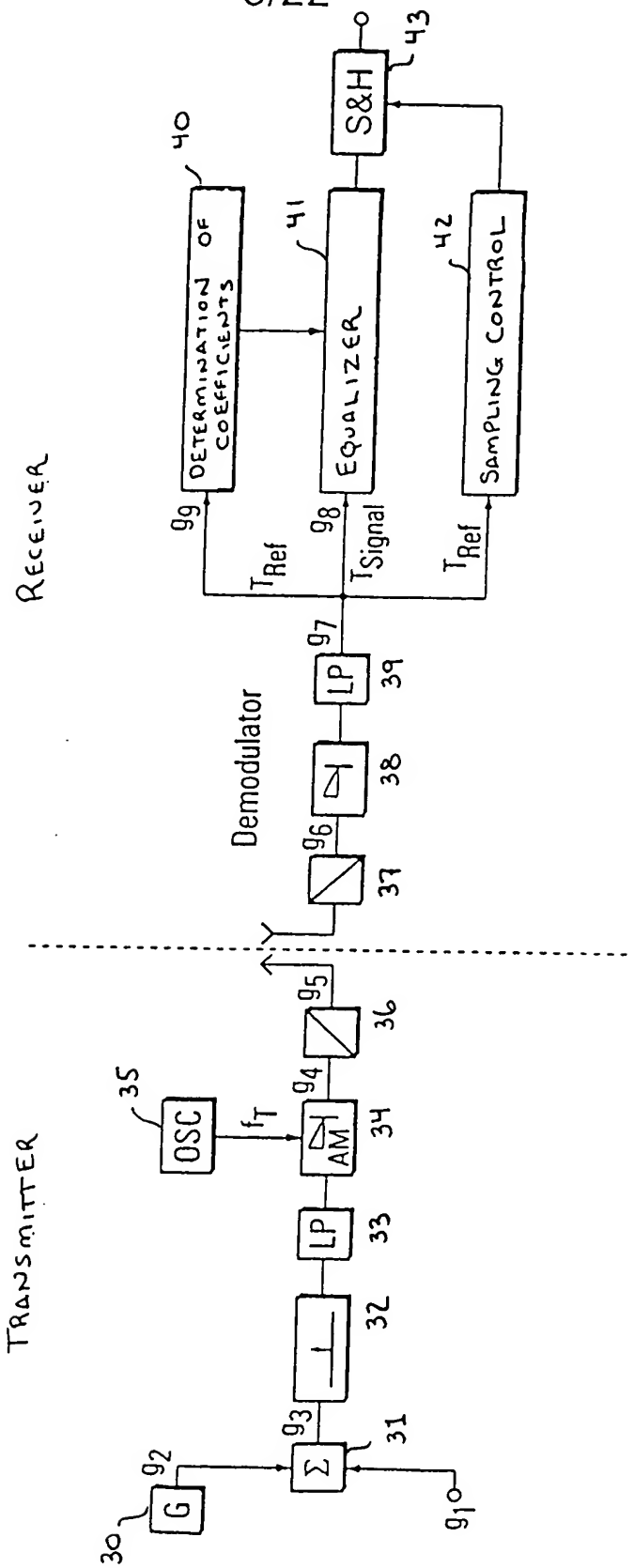

TRANSMITTER
RECEIVER
Demodulator
G
Σ
LP
AM
OSC
LP
S&H
DETERMINATION OF COEFFICIENTS
EQUALIZER
SAMPLING CONTROL
T_{Ref}
T_{Signal}
T_{Ref}
f_T
30
31
32
33
34
35
36
37
38
39
40
41
42
43
g_1
g_2
g_3
g_4
g_5
g_6
g_7
g_8
g_9

Fig. 3

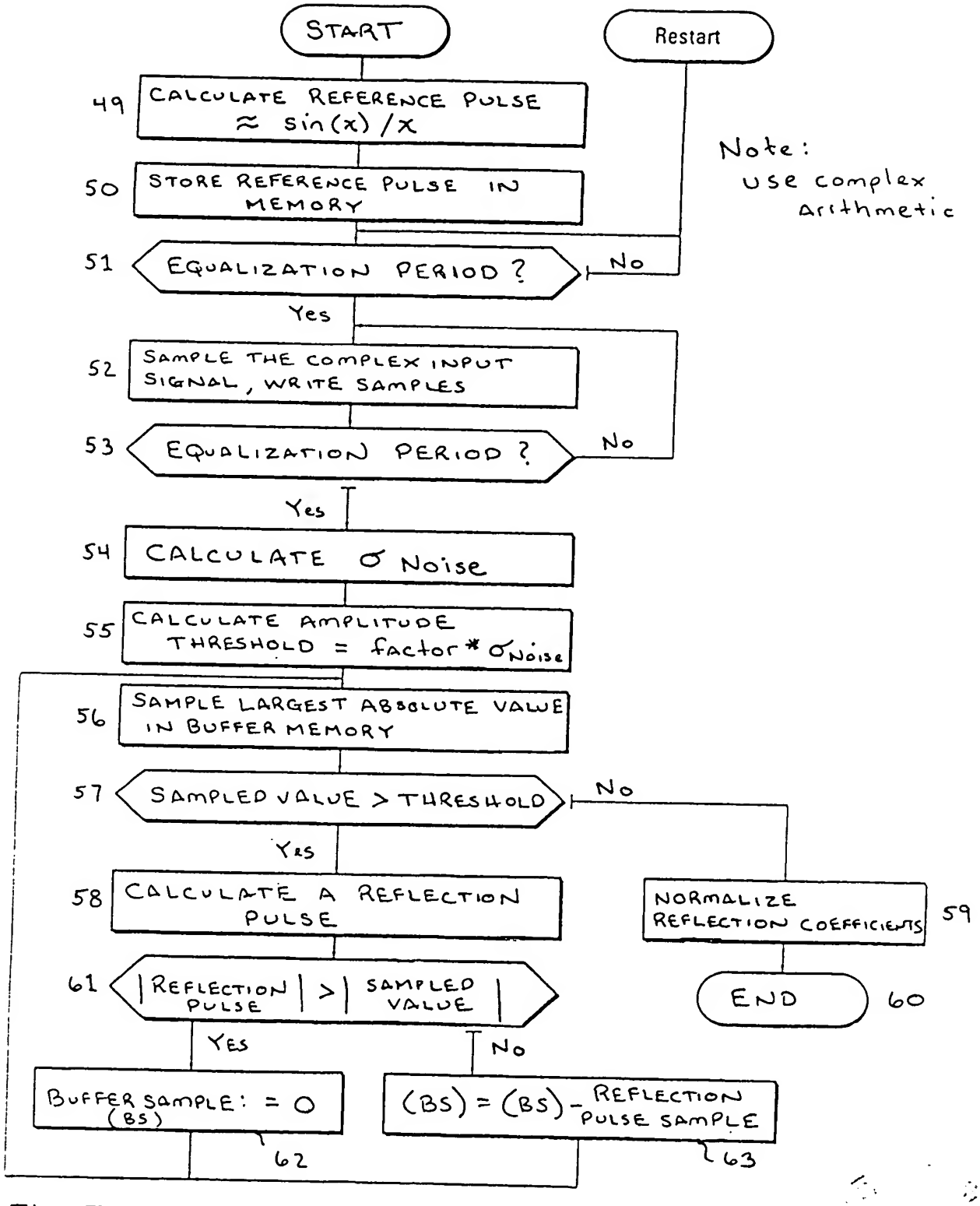

START
Restart
49
CALCULATE REFERENCE PULSE
≈ sin(x)/x
50
STORE REFERENCE PULSE IN MEMORY
Note:
use complex
arithmetic
51
EQUALIZATION PERIOD ?
No
Yes
52
SAMPLE THE COMPLEX INPUT SIGNAL, WRITE SAMPLES
53
EQUALIZATION PERIOD ?
No
Yes
54
CALCULATE σ Noise
55
CALCULATE AMPLITUDE
THRESHOLD = factor * σNoise
56
SAMPLE LARGEST ABSOLUTE VALUE IN BUFFER MEMORY
57
SAMPLED VALUE > THRESHOLD
No
Yes
58
CALCULATE A REFLECTION PULSE
NORMALIZE REFLECTION COEFFICIENTS
59
61
|REFLECTION PULSE| > |SAMPLED VALUE|
END
60
Yes
No
BUFFER SAMPLE (BS) := 0
62
(BS) = (BS) - REFLECTION PULSE SAMPLE
63

Fig. 7

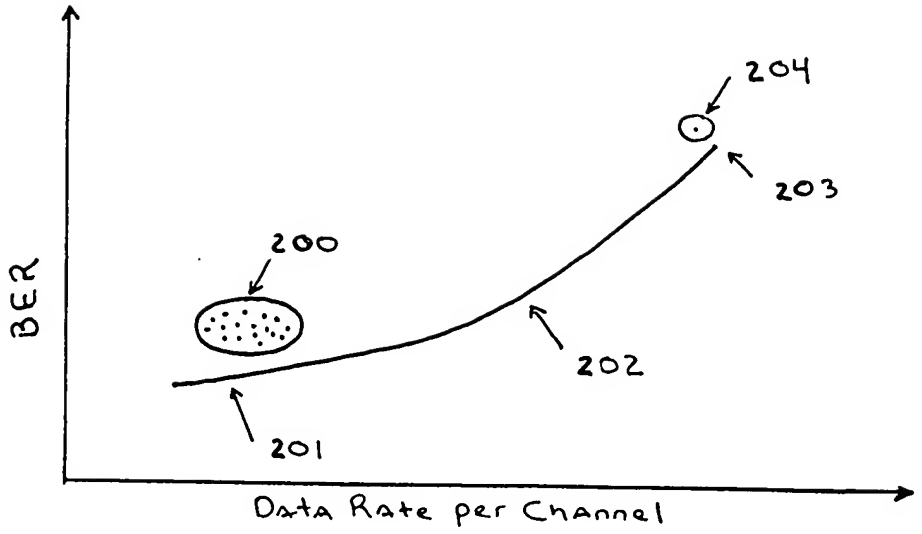


Fig 9.1a

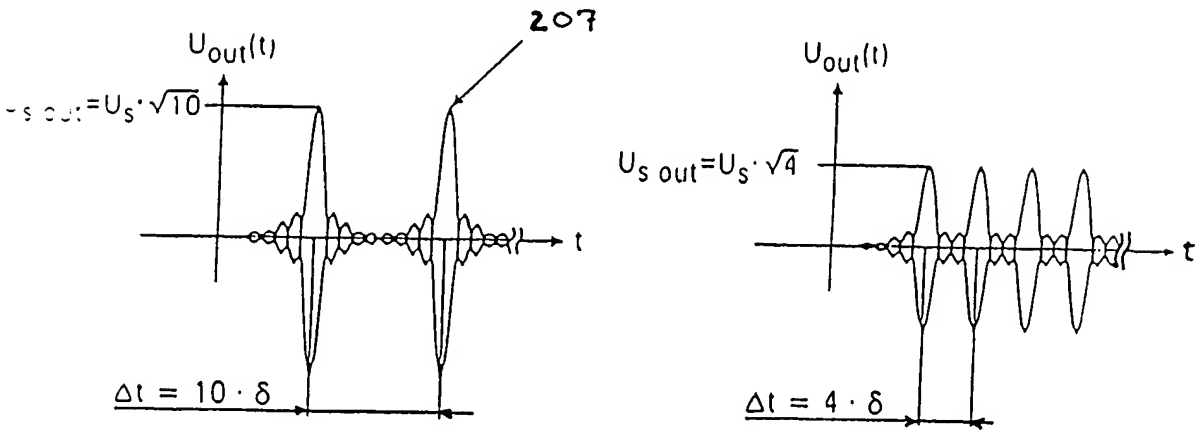


Fig. 9.1b

Fig. 9.1 System Characteristics

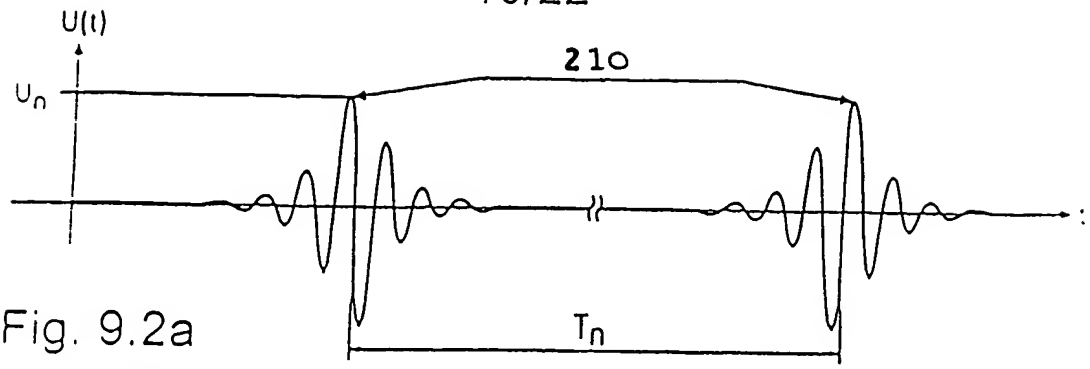


Fig. 9.2a

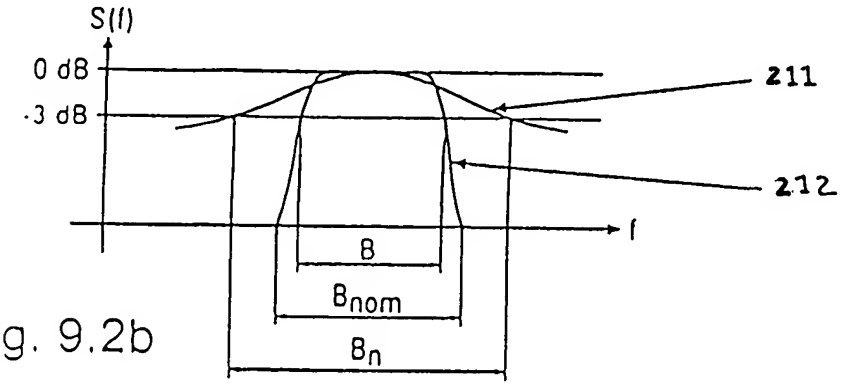


Fig. 9.2b

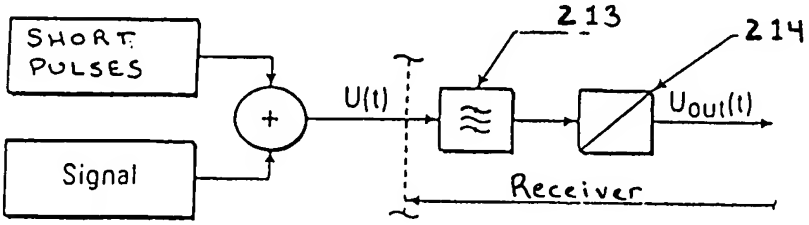


Fig. 9.2c

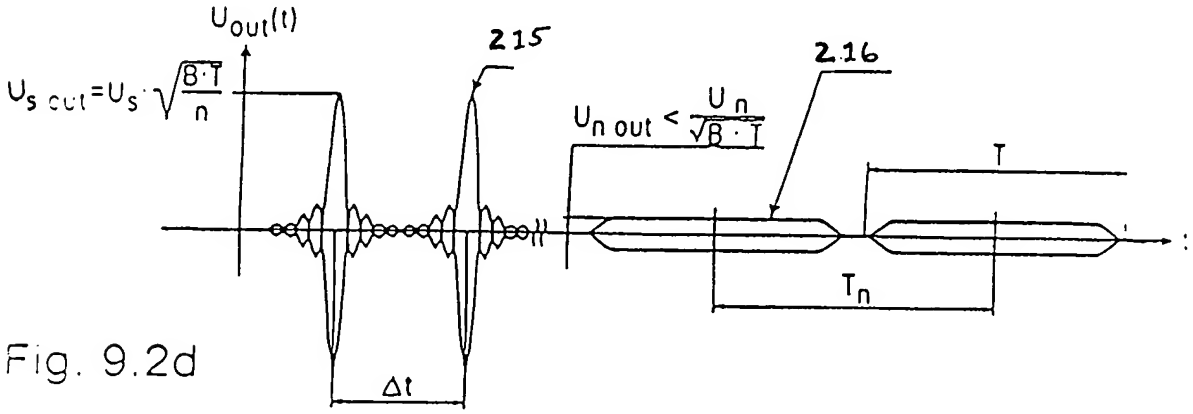


Fig. 9.2d

Fig. 9.2 BROADBAND INTERFERENCE

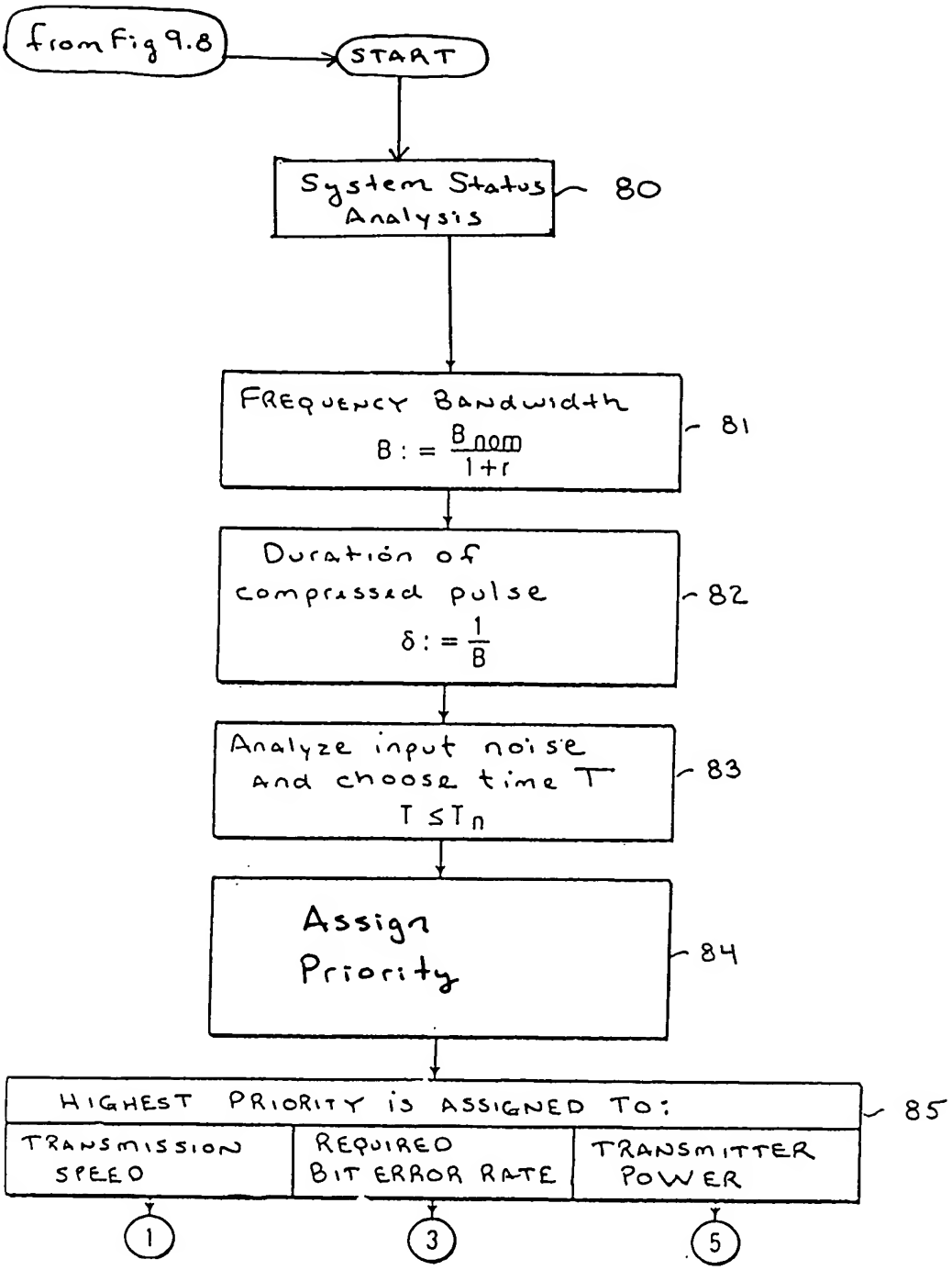


Fig. 9.3 Initialization & Priority Setting

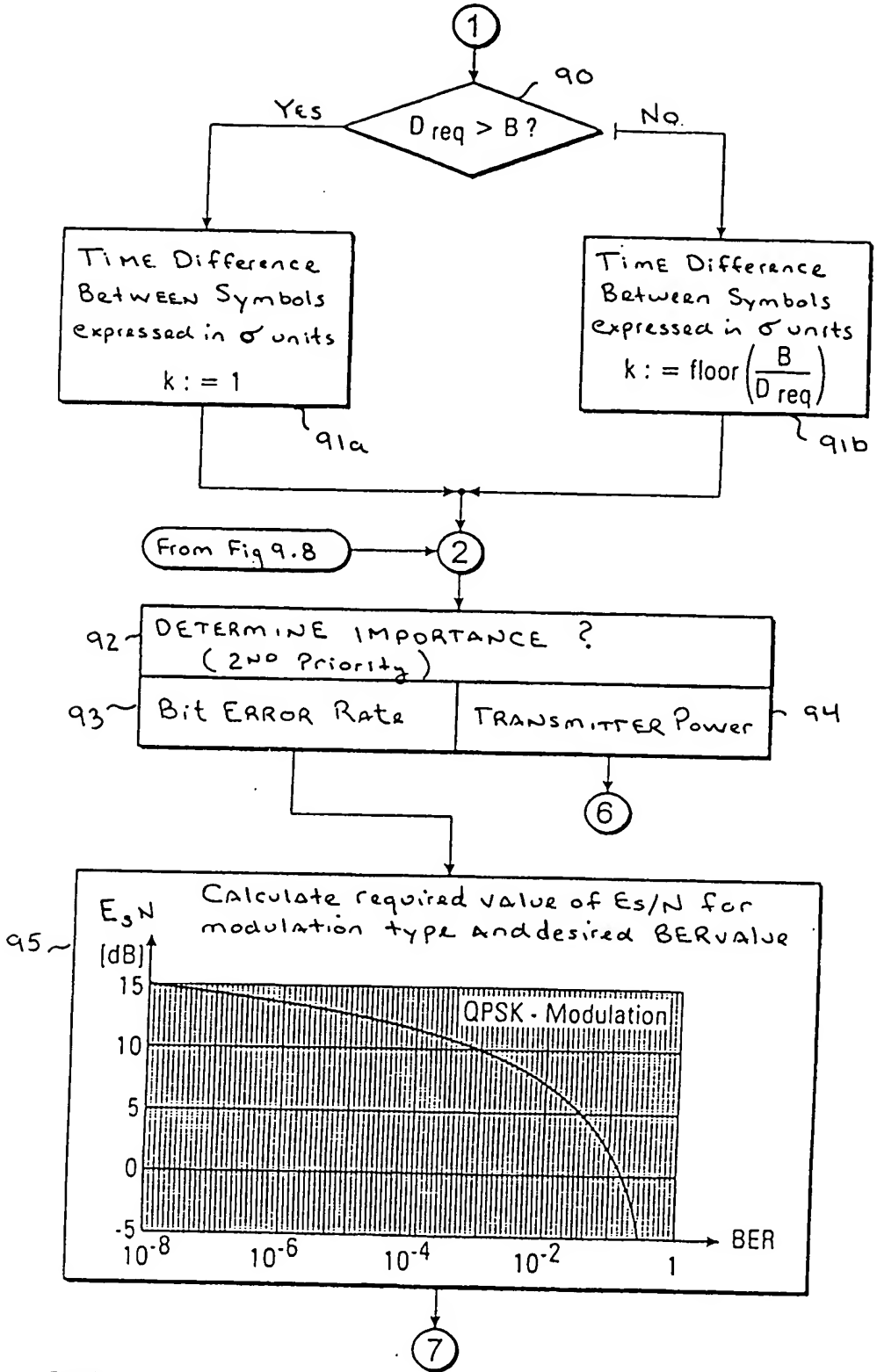


Fig. 9.4 Highest PRIORITY : TRANSMISSION Speed

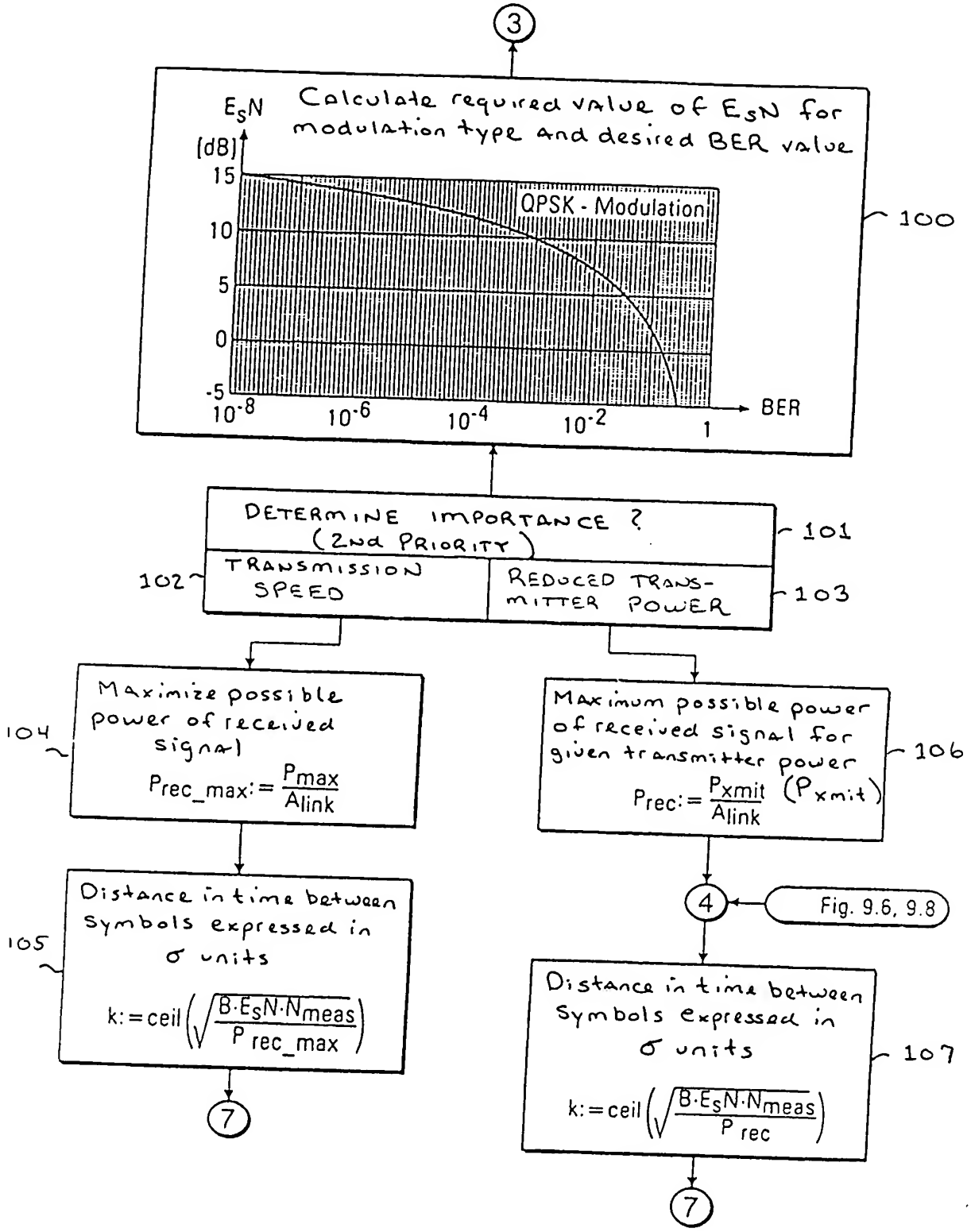


Fig. 9.5: Highest priority for: Required Bit Error Rate

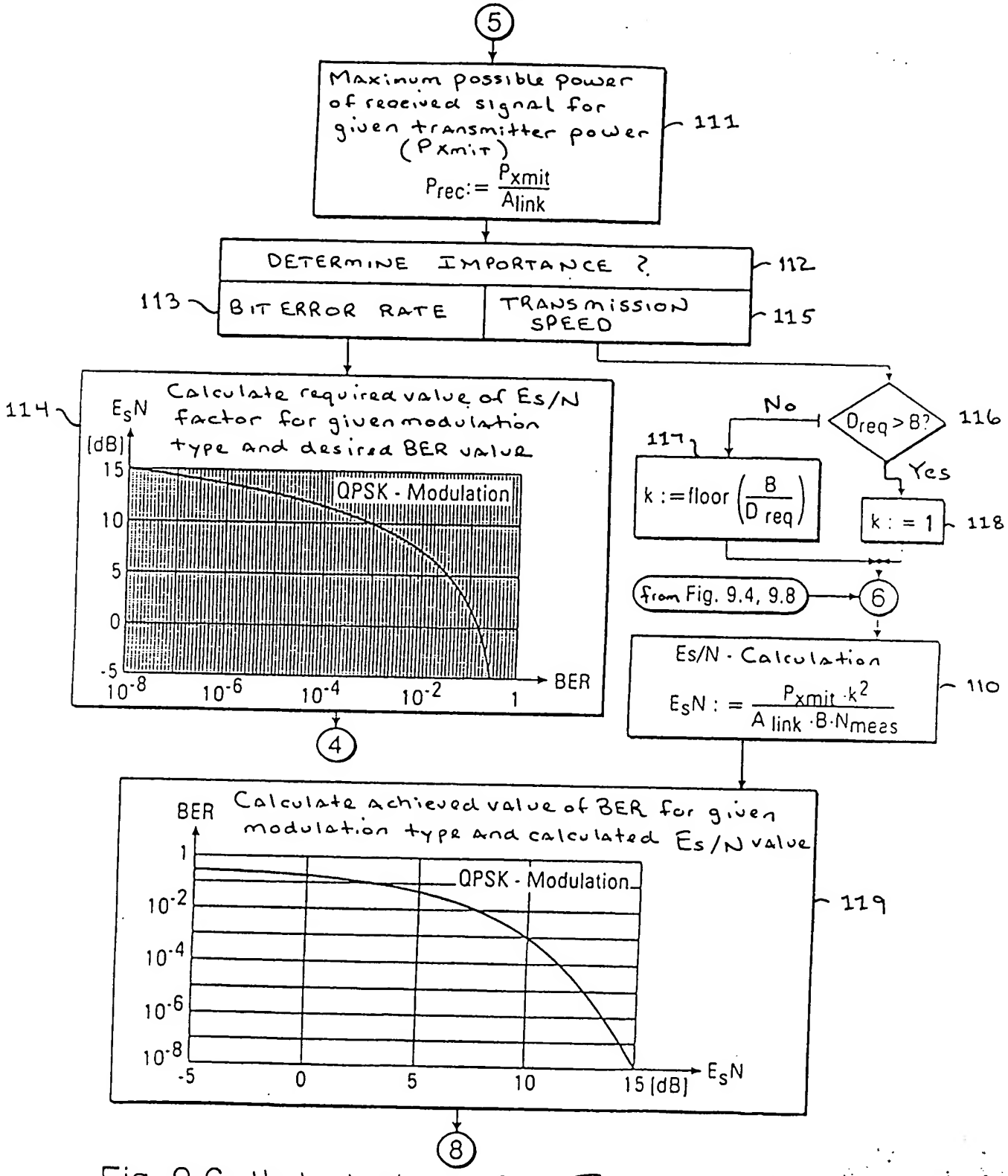


Fig. 9.6 Highest priority for: TRANSMITTER POWER

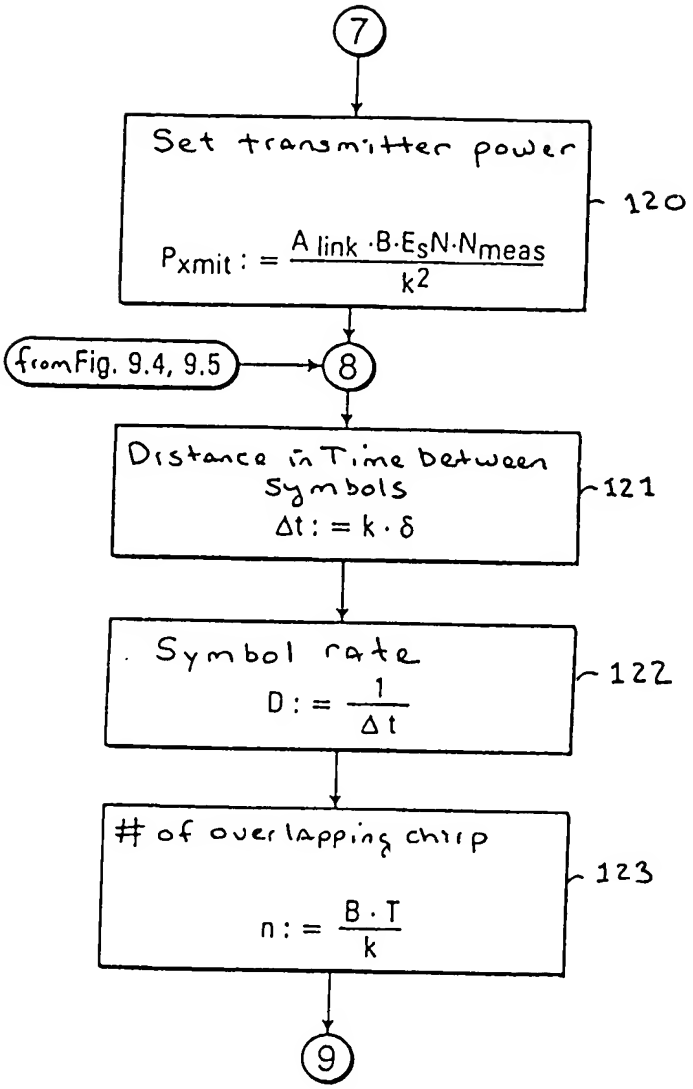


Fig. 9.7 System Parameters

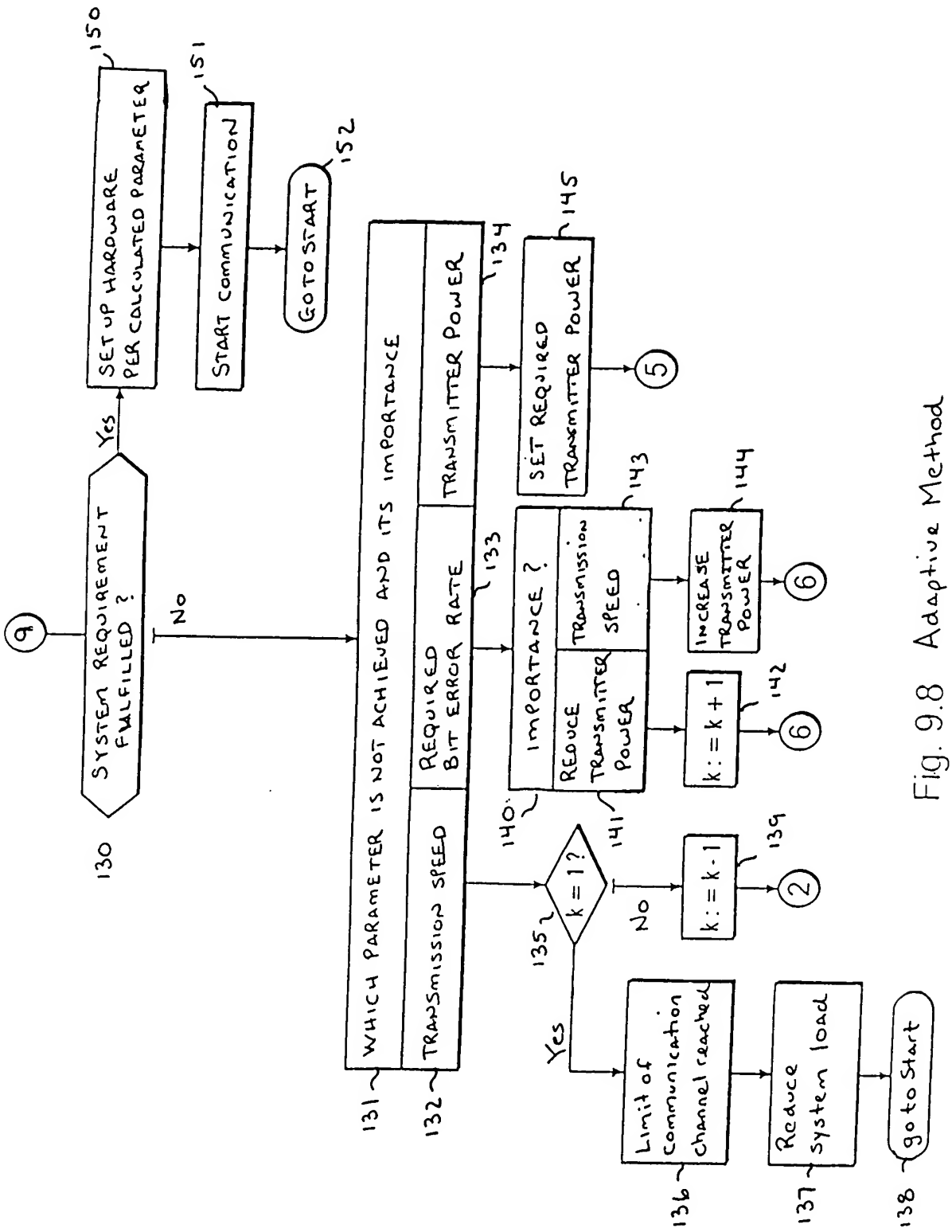


Fig. 9.8 Adaptive Method

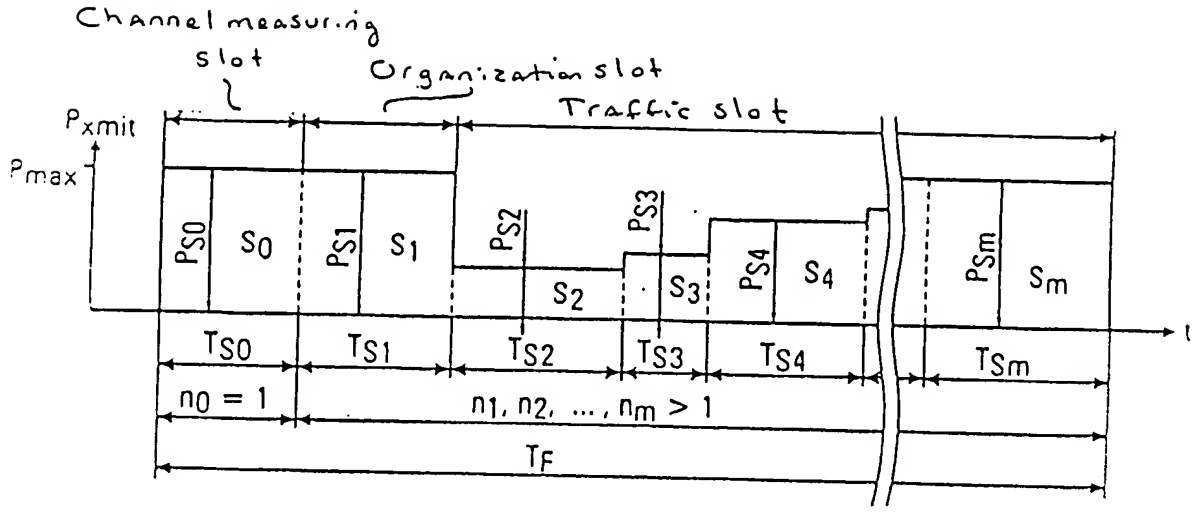


Fig 9.9 Resource Allocation for Sampling System w/ TDMA

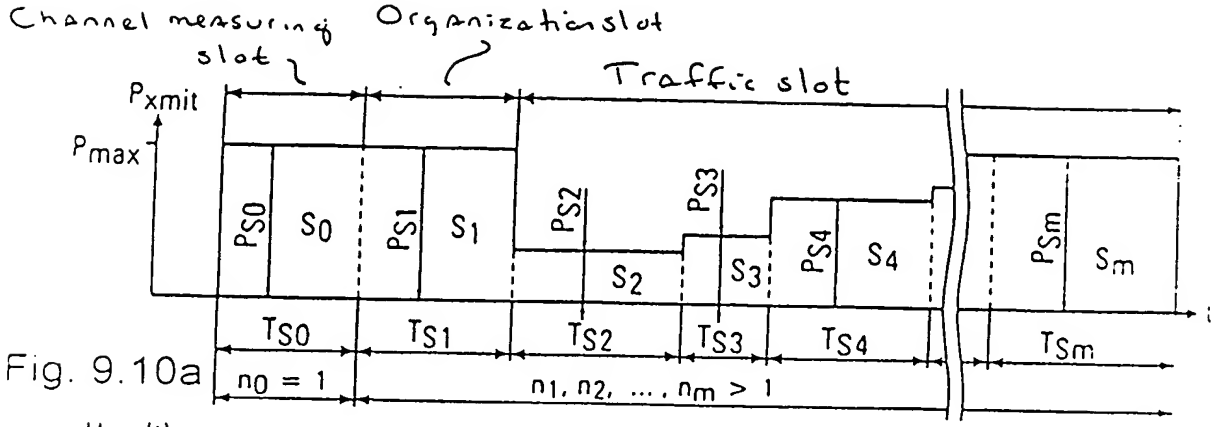


Fig. 9.10a

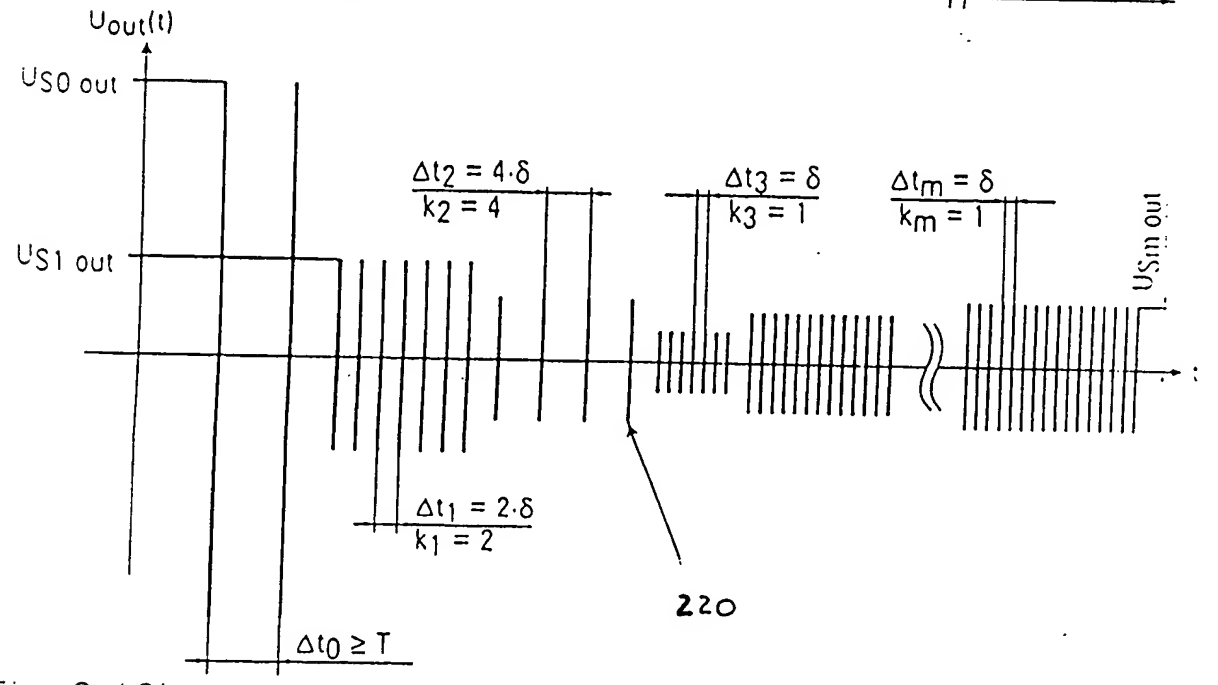


Fig. 9.10b

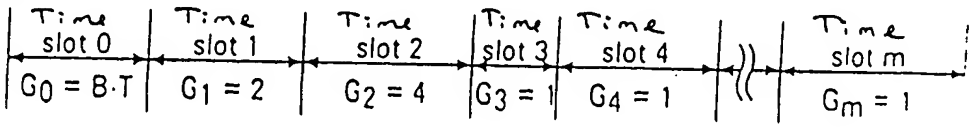


Fig. 9.10 Example of Received Signal

$$U_{S0\,out} = \sqrt{\frac{B \cdot T \cdot P_{S0} \cdot R_0}{A_{link\,0}}} \quad \text{— 230}$$

$$U_{S1\,out} = \sqrt{\frac{2 \cdot P_{S1} \cdot R_0}{A_{link\,1}}} \quad \text{— 231}$$

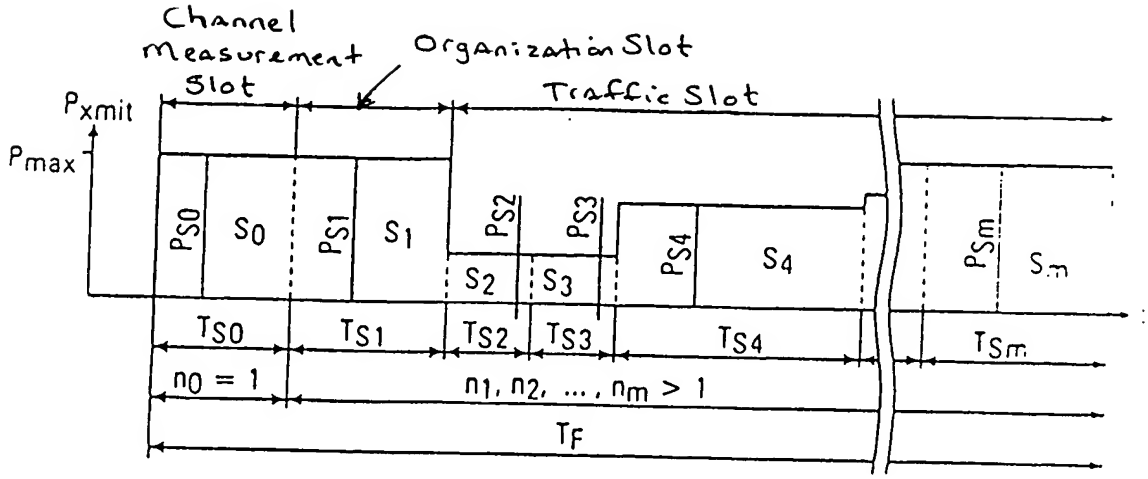
$$U_{S2\,out} = \sqrt{\frac{4 \cdot P_{S2} \cdot R_0}{A_{link\,2}}} \quad \text{— 232}$$

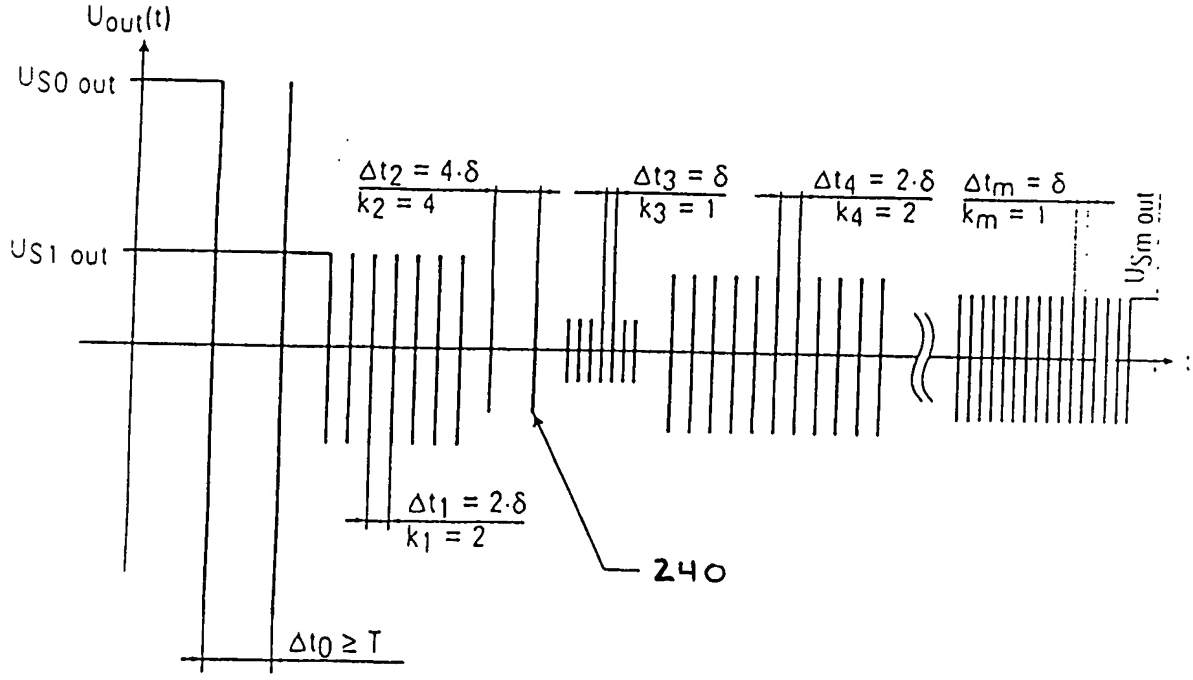
$$U_{S3\,out} = \sqrt{\frac{1 \cdot P_{S3} \cdot R_0}{A_{link\,3}}} \quad \text{— 233}$$

$$U_{S4out} = \sqrt{\frac{1 \cdot P_{S4} \cdot R_0}{A_{link\,4}}} \quad \text{— 234}$$

$$U_{Sm\,out} = \sqrt{\frac{1 \cdot P_{Sm} \cdot R_0}{A_{link\,m}}} \quad \text{— 235}$$

Fig. 9.11 Example of Received Signal (cont.)





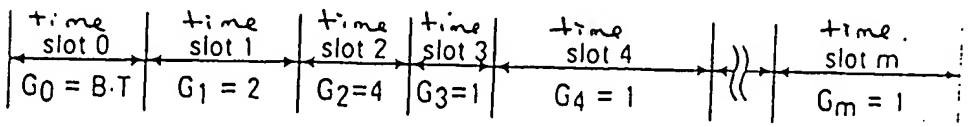


Fig. 9.12 RE-ALLOCATION of RESOURCES

$$U_{S0\ out} = \sqrt{\frac{B \cdot T \cdot P_{S0} \cdot R_0}{A_{link\ 0}}} \quad \sim 250$$

$$U_{S1\ out} = \sqrt{\frac{2 \cdot P_{S1} \cdot R_0}{A_{link\ 1}}} \quad \sim 251$$

$$U_{S2\ out} = \sqrt{\frac{4 \cdot P_{S2} \cdot R_0}{A_{link\ 2}}} \quad \sim 252$$

$$U_{S3\ out} = \sqrt{\frac{1 \cdot P_{S3} \cdot R_0}{A_{link\ 3}}} \quad \sim 253$$

$$U_{S4 out} = \sqrt{\frac{2 \cdot P_{S4} \cdot R_0}{A_{link\ 4}}} \quad \sim 254$$

$$U_{Sm\ out} = \sqrt{\frac{1 \cdot P_{Sm} \cdot R_0}{A_{link\ m}}} \quad \sim 255$$

Fig 9.13 RE-ALLOCATION OF RESOURCES (contd.)

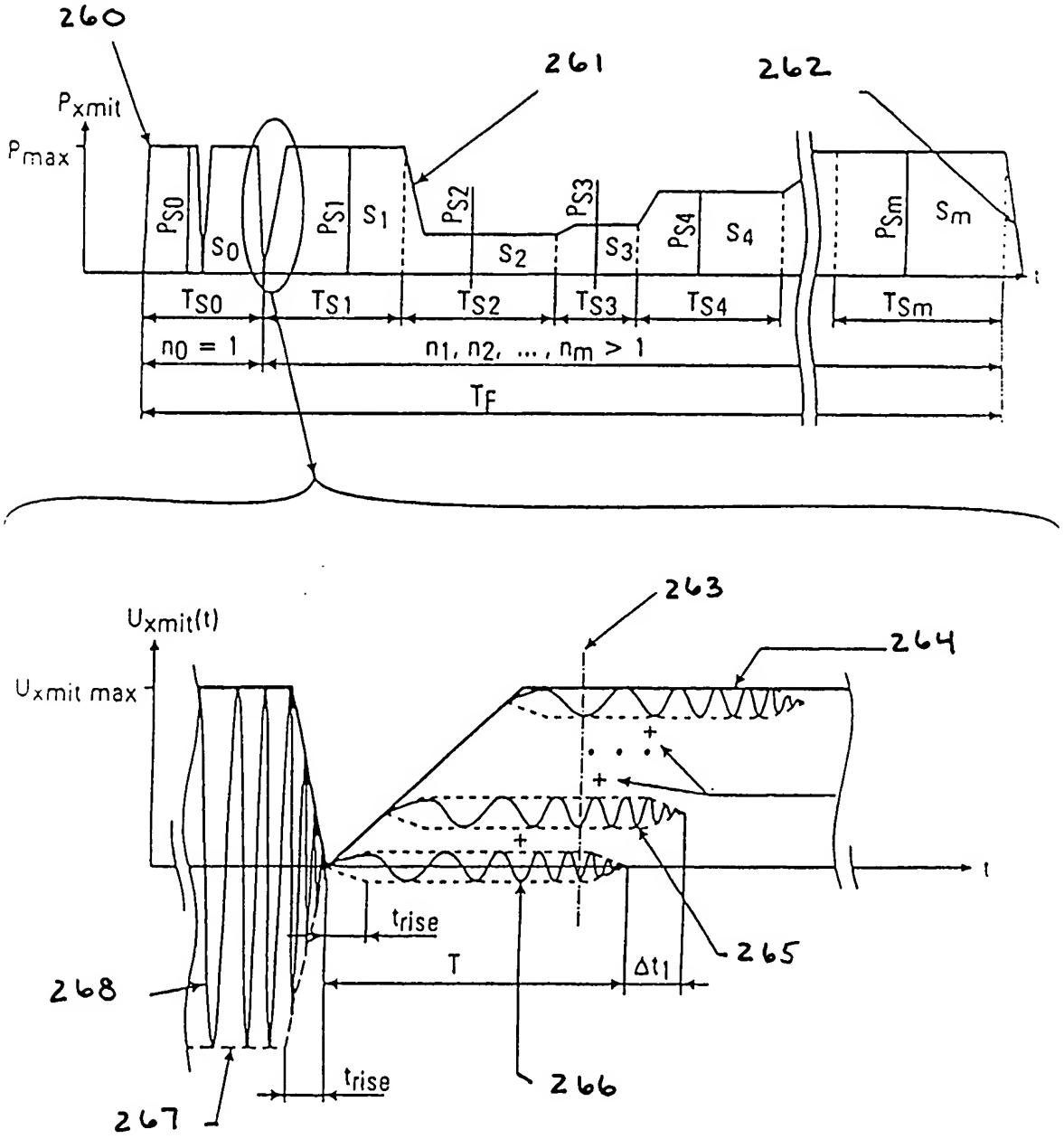


Fig. 9.14 Chirp Pulse Overlapping

9/22 (MARK-UP)

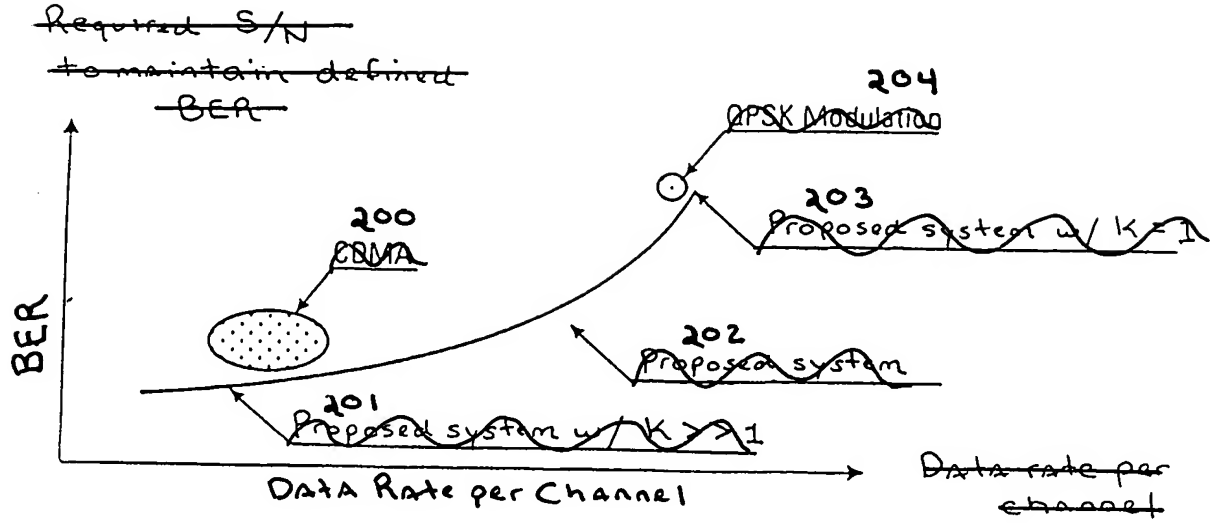


Fig. 9.1a

Simple modification of the K value, represents the difference in time between

$\Delta t = k \cdot \delta$

Example:

Constant transmitter power P_{xmit}

Case 1: K = 10

Case 2: K = 4

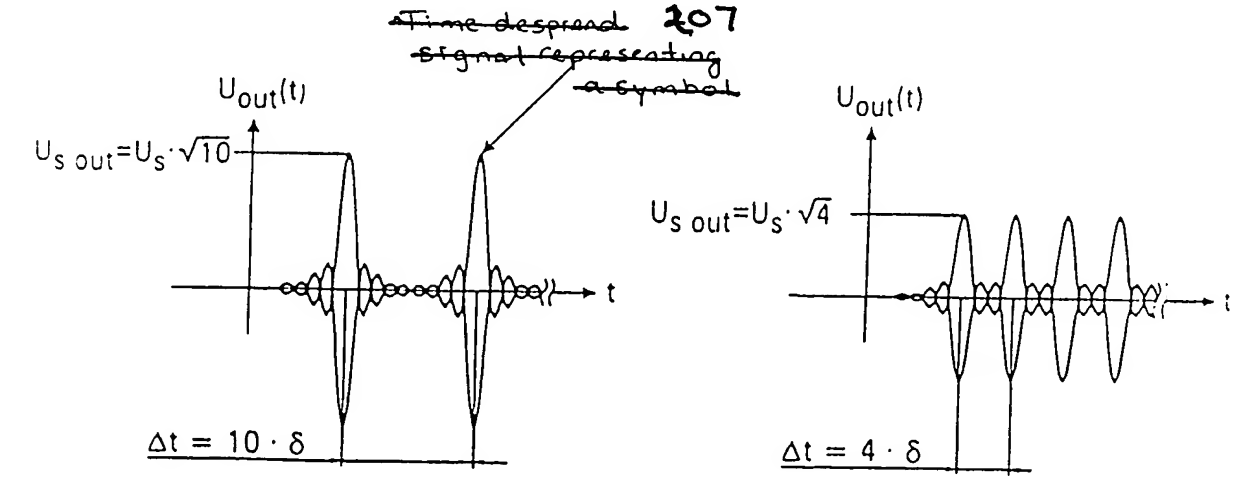


Fig. 9.1b

Fig. 9.1 System Characteristics

10/22 (MARK-UP)

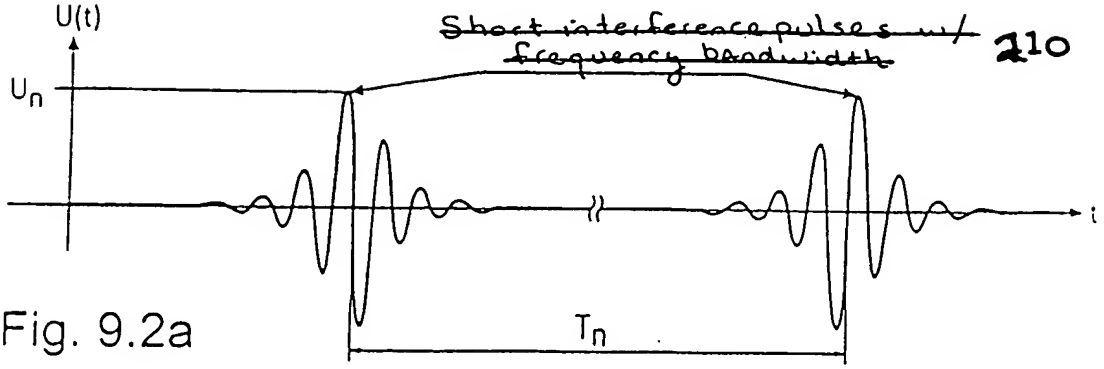


Fig. 9.2a

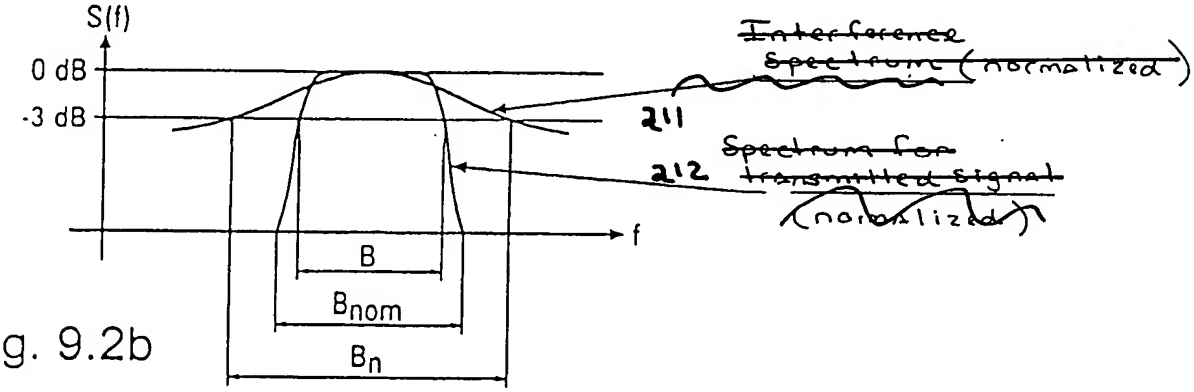


Fig. 9.2b

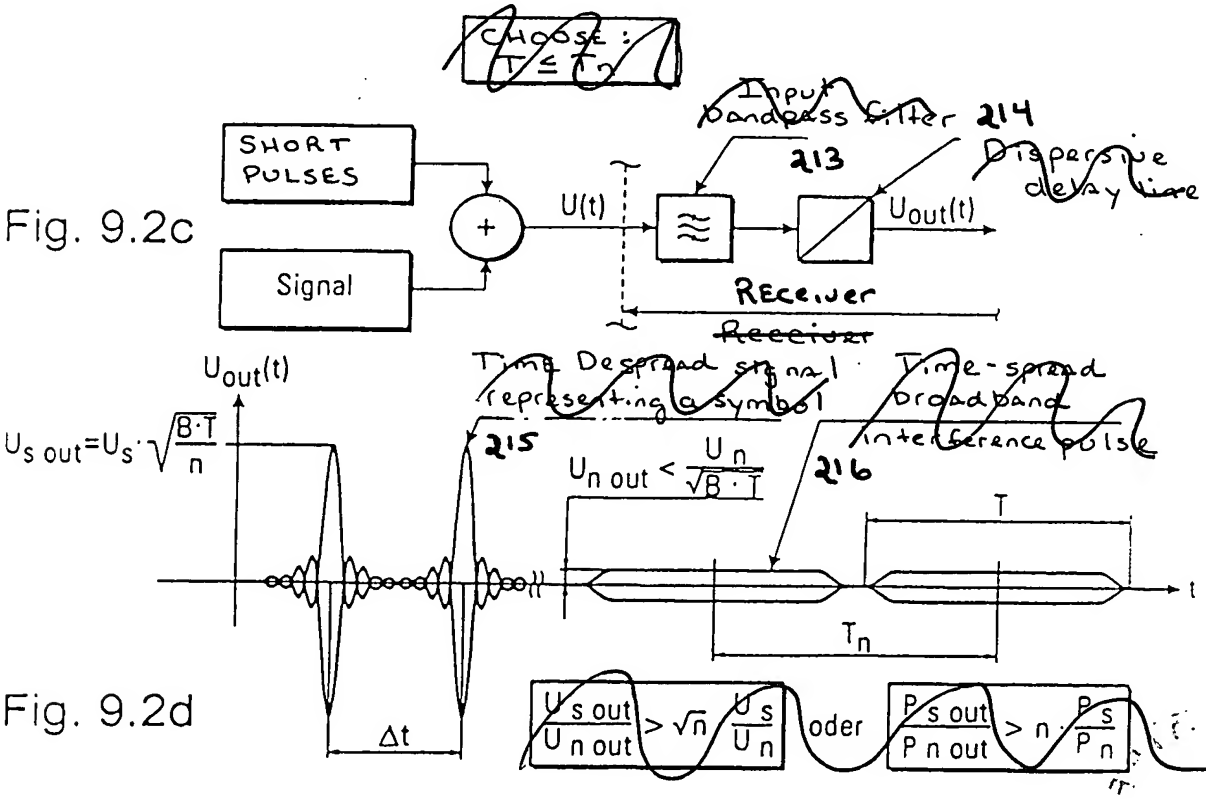


Fig. 9.2c

Fig. 9.2d

Fig. 9.2 BROADBAND INTERFERENCE

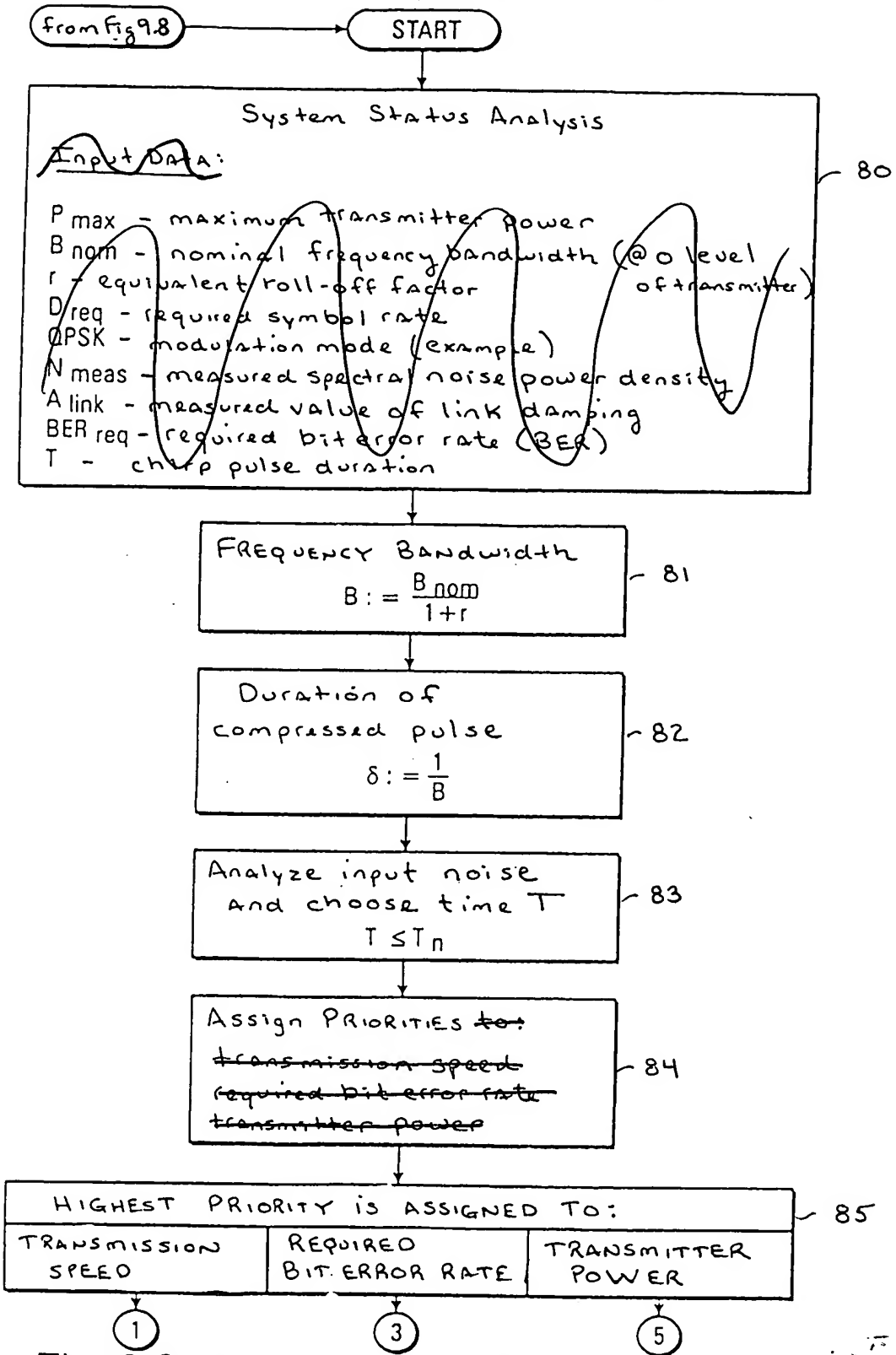
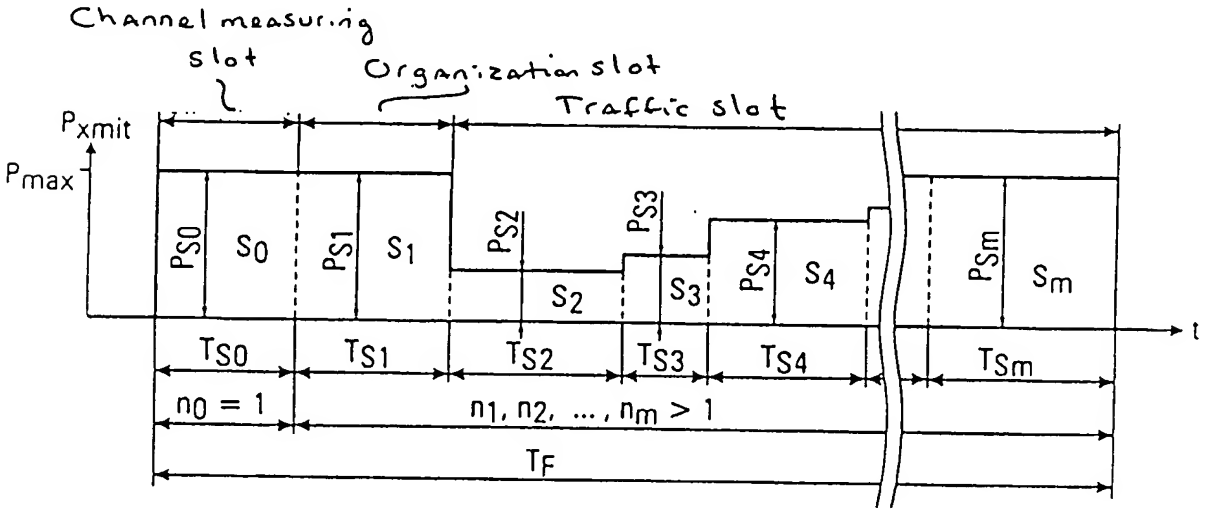


Fig. 9.3 Initialization & Priority Setting

17/22 (MARK-UP)

Resource Allocation -
arranged and controlled on
the time axis enabling full system
capacity to be used at all times to provide best efficiency

Example of Resource Allocation in TDMA Systems:
allocated resources are: signal power for each time slot,
duration of each time slot



where:

$n_0, n_1, n_2 \ldots n_m$ – number of overlapping pulses for timeslots

P_{max} – maximum transmitter power

$P_{s0}, P_{s1}, P_{s2} \ldots P_{sm}$ – Assigned transmitter power per timeslot

S_0 – time slot 0 assigned to time equalization method

S_1 – time slot 1 assigned to the organization channel

S_2 – time slot 2 assigned to the first traffic channel

S_3 – time slot 3 assigned to the second traffic channel

S_4 – timeslot 4 Assigned to the third traffic channel

S_m – time slot m Assigned to the last traffic channel

T_F = frame duration

$$T_F = \sum_{i=0}^{m} T_{Si}$$

$T_{s0}, T_{s1}, T_{s2} \ldots T_{sm}$ = duration of timeslots 0, 1, 2 ... m.

Fig. 9.9 Resource Allocation for Sampling System w/ TDMA

~~Example of received signal according to the time despreading method for resources allocated as in Fig 9.9.~~

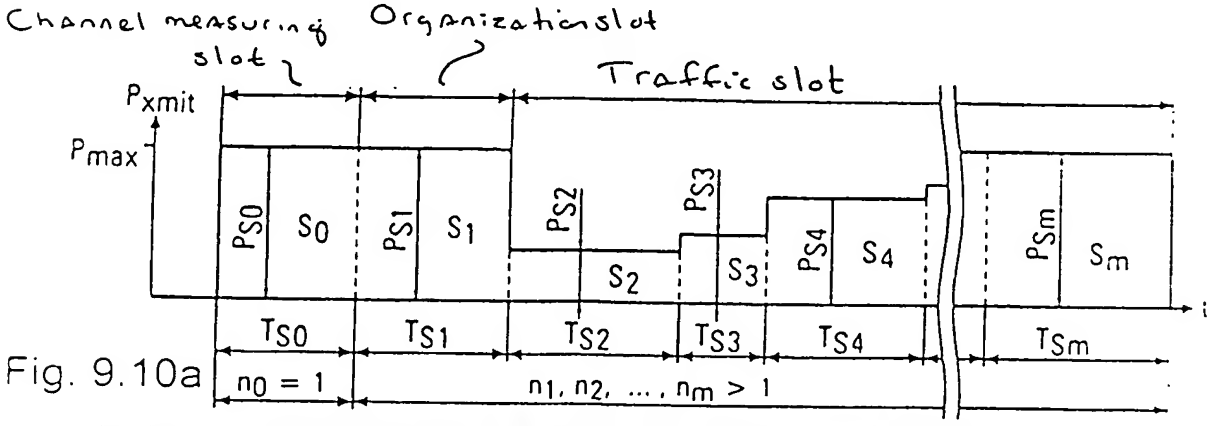


Fig. 9.10a

~~The symbol received can be represented schematically as shown below:~~

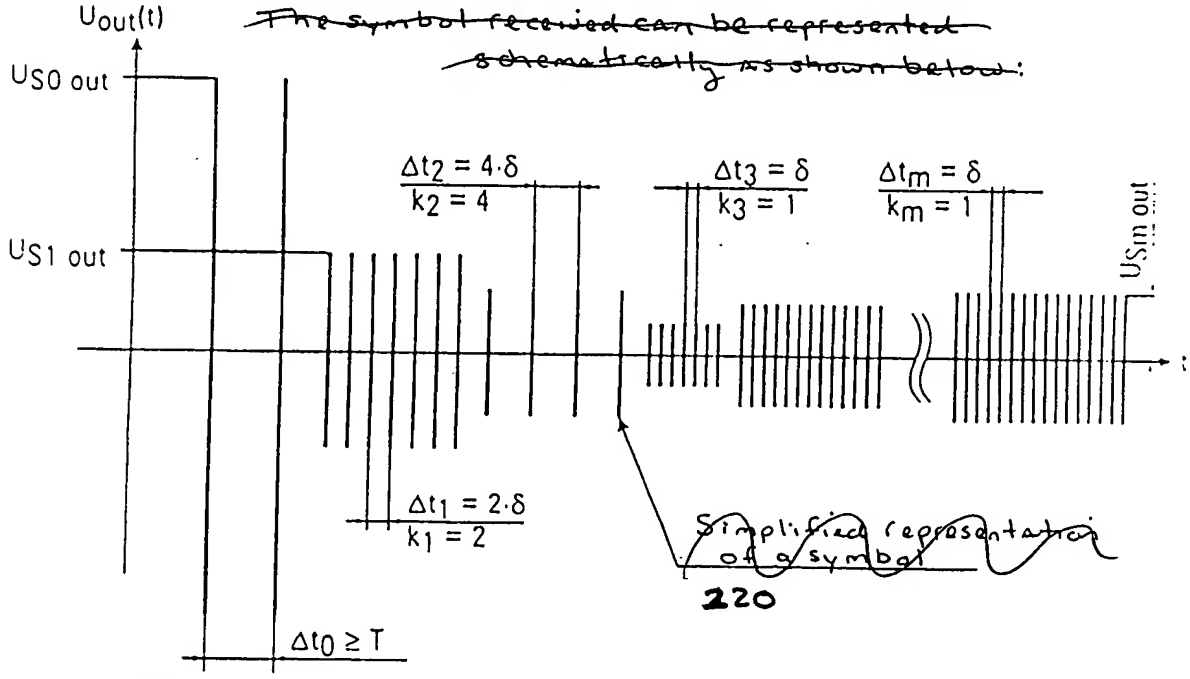
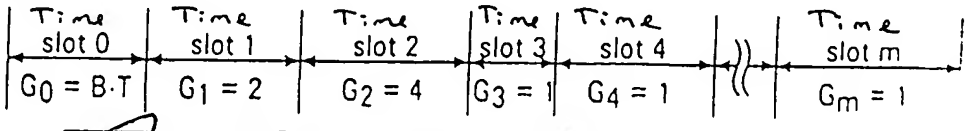


Fig. 9.10b



$$G_i = \frac{B \cdot T}{n_i}; \quad i = 0, 1, 2, \ldots, m$$

$$U_{Si\,out} = \sqrt{G_i \cdot \frac{P_{Si} \cdot R_0}{A_{link\,i}}} = \sqrt{\frac{B \cdot T \cdot P_{Si} \cdot R_0}{n_i \cdot A_{link\,i}}}$$

Fig. 9.10 Example of Received Signal

~~Example of received signal according to the time despreading method (contd.)~~

where:

$A_{link\ 0}, A_{link\ 1}, \ldots, A_{link\ m}$ - damping of transmitter ⇔ receiver link and the effective frequency bandwidth of the system for time slots 0, 1, 2, ... m

$G_0, G_1, G_2, \ldots, G_m$ - additional system gain for timeslots 0, 1, 2, ... m

$k_0, k_1, k_2, \ldots, k_m$ - distance between symbols (expressed as integral multiples of the σ time) for time slots 0, 1, 2, ... m

R_0 - nominal value of the load resistance

T - duration of chirp signal

$\Delta t_0, \Delta t_1, \Delta t_2, \ldots, \Delta t_m$ - intersymbol distance for timeslots 0, 1, 2 ... m

$U_{S0\ out}, U_{S1\ out}, \ldots, U_{Sm\ out}$ - amplitude of the de-spread symbol for time slot number 0, 1, 2, ... m (e.g. output of the dispersive delay line → see Fig 9.2)

B - effective frequency bandwidth of the system.

$$U_{S0\ out} = \sqrt{\frac{B \cdot T \cdot P_{S0} \cdot R_0}{A_{link\ 0}}}$$ 230

~~Pulse Amplitude for channel equalization method~~

$$U_{S1\ out} = \sqrt{\frac{2 \cdot P_{S1} \cdot R_0}{A_{link\ 1}}}$$ 231

~~Symbol Amplitude for the organization channel~~

$$U_{S2\ out} = \sqrt{\frac{4 \cdot P_{S2} \cdot R_0}{A_{link\ 2}}}$$ 232

~~Symbol Amplitude for the first traffic channel~~

..

$$U_{S3\ out} = \sqrt{\frac{1 \cdot P_{S3} \cdot R_0}{A_{link\ 3}}}$$ 233

~~Symbol amplitude for the second traffic channel~~

$$U_{S4out} = \sqrt{\frac{1 \cdot P_{S4} \cdot R_0}{A_{link\ 4}}}$$ 234

~~Symbol Amplitude for the third traffic channel~~

$$U_{Sm\ out} = \sqrt{\frac{1 \cdot P_{Sm} \cdot R_0}{A_{link\ m}}}$$ 235

~~Symbol Amplitude for the last traffic channel~~

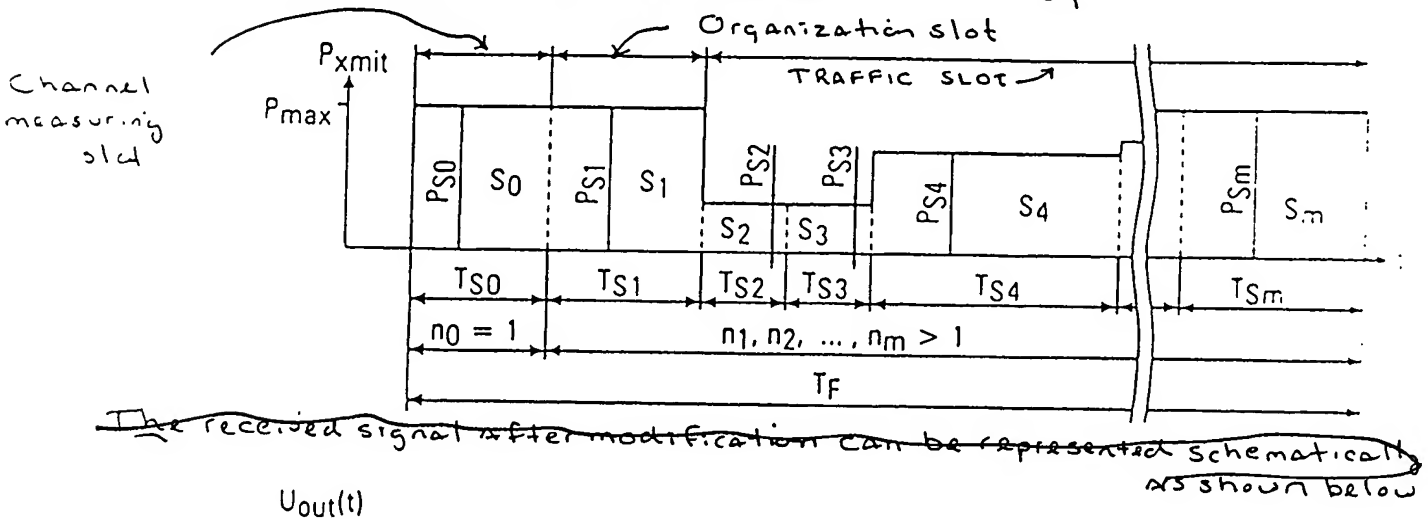
Fig. 9.11 Example of Received Signal (contd.)

~~Modified allocation of resources according to changed system Requirements~~

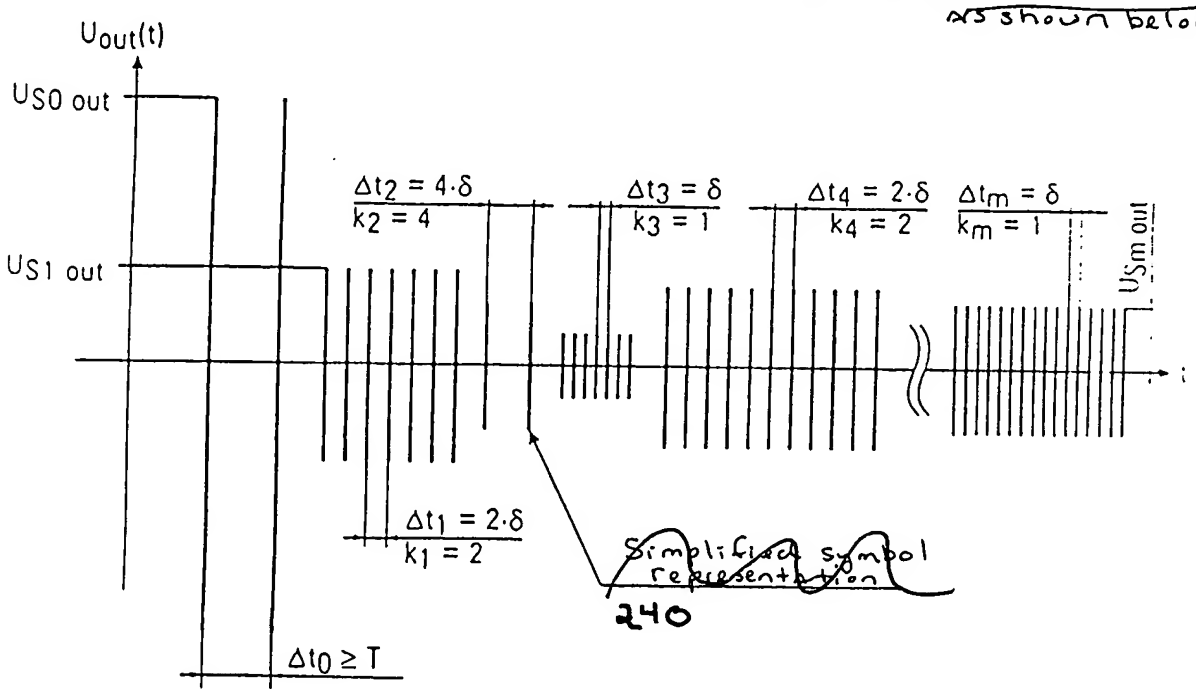
~~→ less time allocated for time slot S_2 and S_3~~

~~→ less transmitter power allocated for time slot S_3~~

~~→ more time allocated for time slot S_4~~



~~The received signal after modification can be represented schematically~~ as shown below:



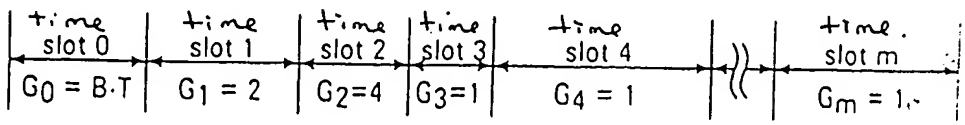


Fig. 9.12 RE-ALLOCATION of RESOURCES

~~Example of Received Signal After Allocation of resources (contd.)~~

~~Amplitude of the time - despread signal~~

$$U_{S0\,out} = \sqrt{\frac{B \cdot T \cdot P_{S0} \cdot R_0}{A_{link\ 0}}}$$ -250 ~~Pulse amplitude for channel equalization method~~

$$U_{S1\,out} = \sqrt{\frac{2 \cdot P_{S1} \cdot R_0}{A_{link\ 1}}}$$ -251 ~~Symbol amplitude for the organization channel~~

$$U_{S2\,out} = \sqrt{\frac{4 \cdot P_{S2} \cdot R_0}{A_{link\ 2}}}$$ -252 ~~Symbol amplitude for the first traffic channel~~

$$U_{S3\,out} = \sqrt{\frac{1 \cdot P_{S3} \cdot R_0}{A_{link\ 3}}}$$ -253 ~~Symbol amplitude for the second traffic channel~~

$$U_{S4out} = \sqrt{\frac{2 \cdot P_{S4} \cdot R_0}{A_{link\ 4}}}$$ -254 ~~Symbol amplitude for the third traffic channel~~

$$U_{Sm\,out} = \sqrt{\frac{1 \cdot P_{Sm} \cdot R_0}{A_{link\ m}}}$$ -255 ~~Symbol amplitude for the last traffic channel~~

Fig. 9.13 RE-Allocation of Resources (contd.)

~~End of Power Envelope for the transmitted signal after Time-Spreading~~

~~Power envelope for the specification of fig 9.9.~~

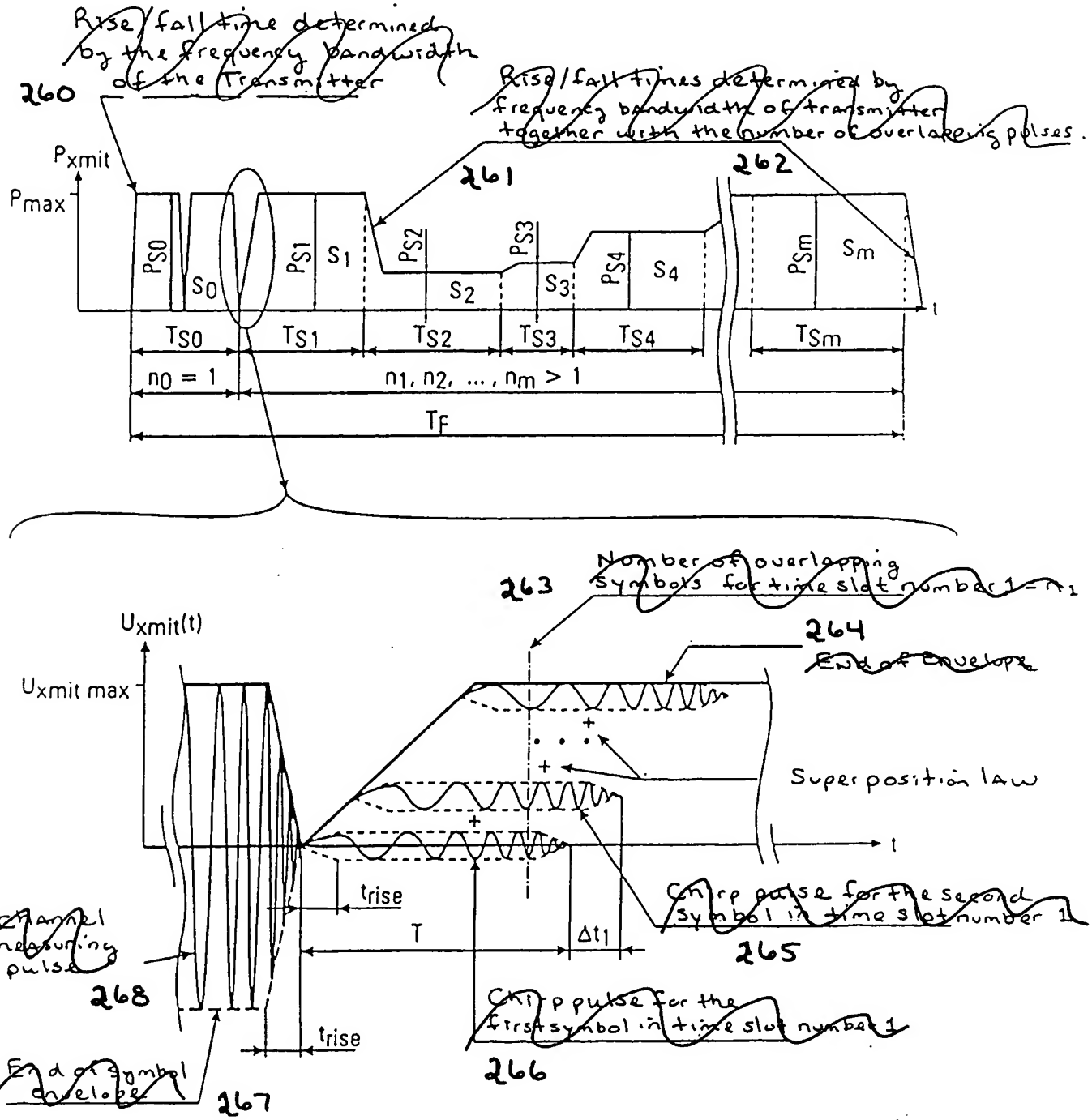


Fig. 9.14 Chirp Pulse Overlapping